

IN THE DRAWINGS

Corrected drawings are supplied herewith.

REMARKS

This responds to the Office Action mailed on May 3, 2005, and the references cited therewith.

Claims 1, 3, 6, 11, 17, 23, 25, 26 and 27 are amended, and claims 5, 7-10, 12, 19-22 and 24 are canceled; as a result, claims 1-4, 6, 11, 13-18, 23, and 25-30 are now pending in this application. Applicant requests reconsideration of this application in view of the above amendments and following remarks.

§102 Rejection of the Claims

A. Rejection: Claims 1-13 were rejected under 35 U.S.C. § 102(b) for anticipation by Kobayashi et al. (U.S. Patent No. 5,542, 600).

B. Response: A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *M.P.E.P.* § 2131. To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter. *PPG Industries, Inc. v. Guardian Industries Corp.*, 75 F.3d 1558, 37 USPQ2d 1618 (Fed. Cir. 1996). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 1 has been amended to recite "...collecting the first printed circuit board from the return position by a carriage at the soldering station and soldering the first component to the printed circuit board using a selective soldering apparatus at the soldering station...and, when a faulty joint on the first printed circuit board is detected, automatically operating the conveyor in a reverse direction, opposite to the first direction, to return the first printed circuit board to the return position, and collecting the board from the return position by the carriage and re-soldering the faulty joint." The Kobayashi et al. reference does not teach reversing the conveyors to return the part to the "return" position and also does not teach soldering at the same soldering station after detecting a faulty joint. By contrast, in the Kobayashi et al. reference, repair or resoldering of the board takes place downstream of the inspection station. (see col.2 lines 26 to 28 of Kobayashi). In other words, after detecting a faulty joint, the board is sent to a different place

for resoldering. In a second embodiment, (described in Kobayashi et al. beginning at col. 13 line 55) boards are carried to a soldering inspection apparatus 30 (see col. 14 line 4). Boards to be treated (faulty boards) are carried into the automatic soldering correction apparatus 60. The correction apparatus 60 is associated with the inspection apparatus 30 (col. 14 lines 26 to 36, and Figures 10 to 13). The inspection / correction apparatus is quite separate to the initial soldering apparatus, as shown in Figure 1 and other places. Also, in the third embodiment (described in Kobayashi et al. beginning at col. 21, line 60) there is a separate correction machine (Fig. 24). As a result, a proper *prima facie* case of anticipation is not made by the Examiner with respect to now amended claim 1 since the Kobayashi et al. fails to disclose every element of the challenged claim. Accordingly, claim 1, as now amended, overcomes the Examiner's rejection under 35 USC § 102(b) as being anticipated by the Kobayashi et al. reference (US 5,542, 600) is now overcome.

By this amendment, claims 5 and 7-10 were canceled thereby making the rejection of claims 5 and 7-10 moot.

Claims 2-4, 6, and 11-13 and depend from claim 1, either directly or indirectly, and include its limitations. As a result, claims 2-4, 6, and 11-13 also overcome the Examiner's rejection under 35 USC § 102(b) as being anticipated by the Kobayashi et al. reference (US 5,542, 600).

C. Rejection: Claims 1, 3, 5-12, 14 and 15 were rejected under 35 U.S.C. § 102(b) for anticipation by Shin et al. (U.S. Patent No. 6,295,728 B1).

D. Response: A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *M.P.E.P.* § 2131. To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter. *PPG Industries, Inc. V. Guardian Industries Corp.*, 75 F.3d 1558, 37 USPQ2d 1618 (Fed. Cir. 1996). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 1 has been amended to recite "...collecting the first printed circuit board from the return position by a carriage at the soldering station and soldering the first component to the printed circuit board using a selective soldering apparatus at the soldering station...and, when a faulty joint on the first printed circuit board is detected, automatically operating the conveyor in a reverse direction, opposite to the first direction, to return the first printed circuit board to the return position, and collecting the board from the return position by the carriage and re-soldering the faulty joint." The Shin et al. reference also fails to teach automatically operating the conveyor in a reverse direction, opposite to the first direction, to return the first printed circuit board to the return position, and collecting the board from the return position by the carriage and re-soldering the faulty joint. In Shin et al., the conveyor line is 'folded' so that the boards are not reversed along their path to the original assembly point. Rather the boards are returned in a loop (see the last four lines of the abstract, and col. 23 lines 21 to 30 of the Shin et al. reference). Shin et al. teaches carriers with different types of printed circuit boards installed therein being transferred to a soldering unit through an upper conveyor. After soldering, each of the carriers is moved down to a lower conveyor to return to its work frame. The printed circuit boards on the carriers are then inspected by the same workers that placed the components onto the printed circuit boards. Therefore, not only are the conveyors not reversed, but the printed circuit boards are returned to the position where they started from after soldering rather than the return station separate from the inspection station. As a result, claim 1, as now amended, overcomes the Examiner's rejection under 35 USC § 102(b) as being anticipated by the Shin et al. (U.S. Patent No. 6,295,728 B1).

By this amendment, claims 5 and 7-10 were canceled thereby making the rejection of claims 5 and 7-10 moot.

Claims 3, 6, 11, 12, 14 and 15 and depend from claim 1, either directly or indirectly, and include its limitations. As a result, claims 2-4, 6, and 11-13 also overcome the Examiner's rejection under 35 USC § 102(b) as being anticipated by the Shin et al. reference (US 6,295,728 B1).

E. Rejection: Claims 1-12 were rejected under 35 U.S.C. § 102(e) for anticipation by Vilella. (US 2004/0208354 A1).

F. Response: A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *M.P.E.P.* § 2131. To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter. *PPG Industries, Inc. V. Guardian Industries Corp.*, 75 F.3d 1558, 37 USPQ2d 1618 (Fed. Cir. 1996). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 1 has been amended to recite "...collecting the first printed circuit board from the return position by a carriage at the soldering station and soldering the first component to the printed circuit board using a selective soldering apparatus at the soldering station...and, when a faulty joint on the first printed circuit board is detected, automatically operating the conveyor in a reverse direction, opposite to the first direction, to return the first printed circuit board to the return position, and collecting the board from the return position by the carriage and re-soldering the faulty joint." The Vilella reference does not teach reversing the conveyors to return the part to the "return" position and also does not teach soldering at the same soldering station after detecting a faulty joint. By contrast, the Vilella reference teaches diverting a defective board to a totally different rework station from the original soldering station (Figure 1 and page 2, para. 0027). In other words, after detecting a faulty joint, the board is sent to a different place for resoldering. As a result, as now amended, overcomes the Examiner's rejection under 35 USC § 102(e) as being anticipated by Vilella (US 2004/0208354 A1).

By this amendment, claims 5 and 7-10 were canceled thereby making the rejection of claims 5 and 7-10 moot.

Claims 2- 4, 6, 11-13 and depend from claim 1, either directly or indirectly, and include its limitations. As a result, claims 2-4, 6, and 11-13 also overcome the Examiner's rejection under 35 USC § 102(e) as being anticipated by Vilella (US 2004/0208354 A1).

F. Rejection: Claims 1-5 and 13 were rejected under 35 U.S.C. § 102(e) for anticipation by Shimizu et al. (U.S. Patent No. 6,634,290 B1).

G. Response: A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *M.P.E.P.* § 2131. To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter. *PPG Industries, Inc. V. Guardian Industries Corp.*, 75 F.3d 1558, 37 USPQ2d 1618 (Fed. Cir. 1996). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 1 has been amended to recite that "...while the second printed circuit board is being soldered, automatically inspecting the first printed circuit board to detect the presence of a faulty joint on the first printed circuit board..." In Shimizu the initial printing and inspection steps are combined. As a result, a second board cannot be printed with solder cream (soldered) while the first board is being inspected. Consequently, claim 1 overcomes the Examiner's rejection under 35 U.S.C. § 102(e) for anticipation by Shimizu et al. (U.S. Patent No. 6,634,290 B1).

By this amendment, claims 5 and 7-10 were canceled thereby making the rejection of claims 5 and 7-10 moot.

Claims 2- 4, 6, 11-12 and depend from claim 1, either directly or indirectly, and include its limitations. As a result, claims 2-4, 6, and 11-12 also overcome the Examiner's rejection under 35 USC § 102(e) as being anticipated by Shimizu et al. (U.S. Patent No. 6,634,290 B1).

§103 Rejection of the Claims

A. Rejection: Claims 16-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shin et al. (U.S. Patent No. 6,295,728 B1) in view of Graves et al. (US 2002/0079353 A1).

B. Response: In order for the Examiner to establish a *prima facie* case of obviousness, three base criteria must be met. First, there must be some suggestion or motivation, either in the

references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference or references must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *M.P.E.P.* § 2142 (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir. 1991)).

Claim 16 depends from Claim 1. Claim 1 has been amended to recite "...collecting the first printed circuit board from the return position by a carriage at the soldering station and soldering the first component to the printed circuit board using a selective soldering apparatus at the soldering station...and, when a faulty joint on the first printed circuit board is detected, automatically operating the conveyor in a reverse direction, opposite to the first direction, to return the first printed circuit board to the return position, and collecting the board from the return position by the carriage and re-soldering the faulty joint." The Shin et al. reference fails to teach or suggest automatically operating the conveyor in a reverse direction, opposite to the first direction, to return the first printed circuit board to the return position, and collecting the board from the return position by the carriage and re-soldering the faulty joint. By contrast, the conveyor line in Shin et al. is 'folded' so that the boards are not reversed along their path to the original assembly point. Rather the boards are returned in a loop (see the last four lines of the abstract, and col. 23 lines 21 to 30 of the Shin et al. reference). Shin et al. teaches carriers with different types of printed circuit boards installed therein being transferred to a soldering unit through an upper conveyor. After soldering, each of the carriers is moved down to a lower conveyor to return to its work frame. The printed circuit boards on the carriers are then inspected by the same workers that placed the components onto the printed circuit boards. Therefore, not only are the conveyors not reversed, but the printed circuit boards in Shin et al. are returned to the position where they started from for inspection after soldering rather than to an inspection station. The Graves et al. reference also fails to teach or suggest these missing elements. Since neither of the prior art references must teach or suggest all the claim limitations, the Examiner has failed to make out a proper prima facie case of obviousness with respect to claim 16. As a result, claim 16, as now amended, overcomes the Examiner's rejection under 35

U.S.C. § 103(a) as being unpatentable over Shin et al. (U.S. Patent No. 6,295,728 B1) in view of Graves et al. (US 2002/0079353 A1).

Claim 17 recites "A soldering apparatus comprising...a conveyor for conveying a printed circuit board in a first direction through a return position in a soldering station having the molten solder container thereat and through an inspection station having an inspection apparatus thereat, and in a reverse direction opposite the first direction...and control apparatus for operating the conveyor in the reverse direction to automatically return the board to the soldering station if a joint does not meet the predetermined requirements." The Shin et al. reference does not teach a separate return position and inspection station. In addition, the Shin et al. conveyor does not reverse. Therefore the conveyor of Shin et al. does not meet the conveyor of claim 17. In addition, the Graves et al. reference does not teach or suggest these elements. As a result, claim 17, as now amended, overcomes the Examiner's rejection under 35 U.S.C. § 103(a) as being unpatentable over Shin et al. (U.S. Patent No. 6,295,728 B1) in view of Graves et al. (US 2002/0079353 A1).

By this amendment, claims 19-22 and claims 24 were canceled thereby obviating the Examiner's rejection 35 U.S.C. § 103(a) as being unpatentable over Shin et al. (U.S. Patent No. 6,295,728 B1) in view of Graves et al. (US 2002/0079353 A1) with respect to those claims.

Claims 18, 23, and 25-30 depend from claim 17, either directly or indirectly, and include its limitations. As a result, claims 18, 23, and 25-30 also overcome the Examiner's rejection 35 U.S.C. § 103(a) as being unpatentable over Shin et al. (U.S. Patent No. 6,295,728 B1) in view of Graves et al. (US 2002/0079353 A1).

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 349-9587 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

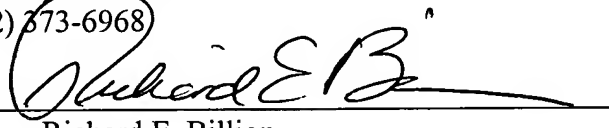
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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Amendment, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 3rd day of November, 2005.

PATRICIA A. HULTMAN

Name


Signature